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COMPARISON OF POSTOPERATIVE PAIN IN GENERAL ANESTHESIA AND GENERAL ANESTHESIA PLUS SPINAL ANESTHESIA IN ADDICTED PATIENTS UNDERGOING CORONARY ARTERY BYPASS SURGERY

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ABSTRACT

Using low-dose morphine in intrathecal space before surgery, provides sufficient analgesia and reduces the side effects of intravenous analgesic medications. Due to the established tolerance to narcotic drugs in addicted patients, and also the lack of a study that specifically compare Effects of intrathecal morphine on postoperative pain in CABG surgery addicted persons, in this study it is tried to compare Effects of intrathecal morphine on postoperative pain in CABG surgery addicted persons. Among patients for CABG surgery, a total of 60 patients 40-70 years old with a history of drug abuse, were selected in randomized, clinical trial. Patients were divided into two groups of 30. For the first group, before induction of general anesthesia, 4microgram/kg of morphine was injected into the spinal space. the second group was also placed in a sitting position for 5 min. Postoperative amount of pain were recorded at 1, 4, 8, 12 and 24 hours after extubation. The first time of analgesic request by the patient and the total amount of postoperative opioid consumption was also recorded. The amount of pain in the group receiving intrathecal morphine at 1, 4, 8, 12 and 24 hours after extubation, was significantly lower than in the placebo group ($P<0.05$). The first time of analgesic request by the patient in the group receiving intrathecal morphine was significantly longer than the control group ($P = 0.04$). The total consumption of morphine for analgesia in a 24-hour period after surgery, in the group receiving intrathecal morphine was significantly lower than the control group ($P = 0.001$). The administration of Intrathecal morphine before surgery in addicted patients undergoing coronary artery bypass surgery, is able to reduce the pain in the first 24 hours after surgery and reduces the need for narcotics in 24 hours after surgery.

Key Words:- Postoperative Pain, CABG Surgery, Intrathecal Morphine.

INTRODUCTION

In the past three decades a revolution has occurred in the management of acute pain after heart bypass surgery and Anesthesiologists with the knowledge gained from the science of pharmacology and regional techniques and neurobiology, have always been at the forefront of research and clinical advances in the

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management of acute pain after surgery(Ferasatkish R, 2008). Surgery cause localized tissue damage that lead to the production of painful material; these materials include: prostaglandins, bradykinin, hydrogen ions, lactic acid and serotonin. These materials, especially prostaglandins and bradykinin, stimulate chemical pain receptors(Miller RD, 2010; Guyton HC, 2000). Beside unpleasant feeling, pain also lead to serious outcomes such as pulmonary complications, metabolic disorders, digestive system disorders, thromboembolism and psychological effects and also creates a feeling of dissatisfaction, insomnia and may even prolong hospitalization (Michaed, 1994; John, 1999). Surgical incision pain, is one of the most common causes of morbidity after heart bypass surgery that occur in more than 50% in these patients (Mailis A, 2000). Pain after osteotomy, is associated with factors such as tissue retraction during surgery, chest tubes, intercostal nerve, leg vein removal and precardotomy. When pain is not controlled well after heart surgery, it is possible that the level of stress hormones in the body increase and myocardial oxygen demand increases and may cause myocardial ischemia (Gurbet A, 2004). The pain after osteotomy may cause the patient to have patient difficulty in coughing, leading to a lack of proper functioning of ventilation. All these conditions may delay patient discharge from the ICU and hospital(Rady MY, 1997). Analgesics are used before incision surgery or after surgery to reduce the pain, but it is observed that controlling pain preemptively that includes prescription drugs before surgical incision, lead to weaken input pain signals to the spinal cord (Kissin, 2000; Nesioonpour SH, 2013). by reduction of these signal to the central nervous system, the occurrence of Hyperalgesia and allodynia after surgery is prevented(OH, 2000).Various methods have been used for postoperative analgesia. The use of opioids and non-steroidal anti-inflammatory drugs to reduce pain after surgery is a common procedure (Gust R, 1999), Although the effectiveness of analgesics are restricted due to complications that follow each of them and these complications prevents the recovery of patients after surgery. The use of opioids such as morphine, intravenously, is associated with the complications such as respiratory depression, excessive sedation creation, biliary tract spasm, impaired gastric bowel movements, nausea and vomiting, and especially in elderly patients with confusion (Lahtinen P, 2002). the use of nonsteroidal anti-inflammatory drugs may cause stomach and intestinal ulcers, impaired kidney function, bleeding due to platelet inhibition (Cattabriga I, 2007).Then these drugs should be used in a way that have minimal complications. The importance of local analgesia in patients undergoing non-cardiac surgery has been widely studied (Beattie WS, 2001; Rodgers A, 2000). The use of low-dose opioids in intrathecal space before surgery, provides sufficient analgesia and reduces the effects of intravenous analgesics, such as respiratory depression, pruritus, nausea and vomiting (Ballantyne JC, 1998). But in heart surgery, local anesthetic techniques are not routinely used because there are few studies that support the use of this technique (Liu SS, 2004). It is shown that the use of low-dose intrathecal morphine to control pain after surgery provides longer analgesia (2004) and has less risk of hematoma compared with epidural techniques (Ho AM, 2000). Use of intrathecal morphine in patients undergoing operation has been studied for several years, but in this study, due to the tolerance established for patients addicted to opioids, and by regarding the fact that these patient need more analgesics such as opioids during and after surgery and according to the fact that there is no study that investigate the intrathecal morphine effects on pain after CABG surgery in addicted persons, it is tried to examine this effect carefully.

MATERIALS AND METHODS

Among patients for CABG surgery, a total of 60 patients 40-70 years old with a history of drug use, at least once a week for more than 6 months, were selected as inclusion criteria. Exclusion criteria included all patients who did not consent to the procedure and also those who had previous CABG procedures or herniated disc, spinal infection, ejection fraction less than 40%, increased intracranial pressure, coagulopathy, and patients who had a cardiac rhythm other than sinus. Moreover, patients whose connectin to the pump bypass lasted more than two hours, patients with emergency surgery and patients with certain kidney disorder (creatinine clearance less than 50ml/min) were also excluded. After the administration 5cc / kg crystalloid for all patients, for the first group, before induction of general anesthesia, patients with spinal anesthesia were placed in the sitting position for 5 min and anesthesiologists injected 20 mg of bupivacaine 0.5% plus 4 microgram/kg morphine into the spinal space. Immediately after injection, the patients were placed in supine positions. The second groups of patients were also followed up on the bed and get 5 cc / kg crystalloid and are placed in a sitting position for 5 min. After placing patients in supine position non-invasive monitoring such as ECG and pulse oximetry were used for patients. Arterial catheters were placed in patients for accurate measurement of blood pressure. For all patients the same drugs for general anesthesia, midazolam 0.02-0.04mg / kg,

sufentanil 0.5 µg / kg, sodium thiopental 3-5mg/kg and atracurium 0.5mg / kg are used. Then the patients are intubated using a proper cuffed tube and were connected to anesthesia machine. And during the operation, capnography and monitoring of central venous pressure were used after insertion of the catheter in the jugular vein or the Subclavian. During anesthesia, the patient's arterial blood pressure was maintained between 90-130, and heart rate between 60-100, using vasoactive drugs. After placing the patient on bypass pump, arterial blood pressure was maintained between 60-90. For maintenance of anesthesia, continuous infusion of sufentanil (0.5 µg / kg / hr) and sevoflurane 0.8-1.1% MAC were used before and after patients placing on bypass pump.befor placing on bypass pump, all patients received 1 g of intravenous methylprednisolone. Sufentanil infusion was continued until the end of the surgery while stitching. After completion of surgery, patients without extubation were transferred to the ICU. After 1 hour, in the absence of active bleeding (Less than 100 ml of blood for the first hour after surgery), body temperature higher than 36 ° C, hemodynamic stability, absence of arrhythmias and respiratory rate higher than 6 per minute, patients, given 40 µg / kg neostigmine and 15 µg / kg atropine, are reversed. Complete awakening and alerting of patients is confirmed through the ability to push and keep hands above the head of the body for at least 5 seconds. The tube is extubated and the patient was given oxygen through a face mask. Otherwise, ventilate the patient continue for 1 more hour.And again, if achieving the desired condition, the patient will be extubated. The amount of pain felt by the patient was separately measured using an index (Scaleanaloge Visual (VAS)). This scale consisted of numbers from 0 to 10 and was based on patient feedback. Person indicated the amount of pain he was feeling with a number. On this scale, 10 showed the most intense pain perception and zero indicates that the patient is not feeling any pain. The amount of pain, was recorded after the surgery at 1, 4, 8, 12 and 24 hours and after extubation by someone who did not know how to classify groups. If there was more than 4 VAS, intravenous morphine 0.05mg/kg)) was used, for patients. The time to first analgesic request by the patient and the total amount of postoperative opioid consumption, were also recorded. Statistical analyses were performed by using SPSS 19.0 software. Demographic and surgical information were compared between groups using the unpaired t-test. Pain scores and cumulative morphine consumption were analyzed by means of the Friedman test, pursue by the Mann-Whitney test. All data are showed as mean values ± standard deviation. A p value<0.05 was assigned as statistically significant.

RESULTS

Demographic characteristics and study variables are shown in Table 1. No significant difference was observed between the groups in Table 1. The mean duration of surgery and CPB time was similar in the two groups.(320 ± 61and 333 ± 50 min) and (108 ± 30 and 110 ± 26 min). the less time of CPB for the group who received morphine and the control group was 30.68 ± 2.66 and 31.49 ± 3.02 respectively. Based on the results shown in Table 2, The amount of pain in the group who received Intrathecal morphine at 1, 4, 8, 12 and 24 hour after extubation, was significantly lower than in the placebo group (P<0.05). The amount of short-acting opioid (sufentanil) during anesthesia in the group who received Intrathecal morphine, was significantly lower than in the control group (P = 0.02). The first time of requesting narcotics by the patients in the group who received Intrathecal morphine, was significantly longer than in the control group (P = 0.04). And also total morphine consumption for analgesia during the 24 hours after surgery in the group who received Intrathecal morphine, was significantly lower than in the control group (P = 0.01). (Table 3)

Table 1. Patient Characteristics, Surgery Duration, CPB Time and Minimal Temperature at CPB, (means ± SD) No significant differences

P.value	Control	Morphine	
0.43	25:05	26:04	Sex (M: F)
0.24	56.50 ± 11.72	59.60 ± 8.27	Age (years)
0.10	62.63 ± 6.15	65.58 ± 6.54	Weight (kg)
0.29	333 ± 50	320 ± 61	Surgery Duration (min)
0.73	110 ± 26	108 ± 30	CPB Time (min)
0.45	31.49 ± 3.02	30.68 ± 2.66	Minimal Temperatureat CPB (°C)

Table 2. Intensity of Pain (VAS) between groups (means ± SD)

	1h	4h	8h	12h	24h
Morphine	0(0-1)	1(0-3)	1(0-2)	2(1-4)	3(2-5)
Control	4(2-6)	5(2-7)	4(1-6)	5(2-6)	6(3-7)
P.value	.001	0.001	0.003	0.024	0.036

Table 3. Opioid consumption and first analgesic requirement (means ± SD)

	Morphine	Control	P.value
Intraoperative sufentanil (µg)	21.60 ± 12	35.70 ± 16	0.020
First Analgesic Requirement	6.18 ± 9.40	1.20 ± 0.85	0.047
Morphine consumption in 24 h(mg)	11.66 ± 2.58	41.86 ± 5.43	0.001

DISCUSSION

In this study, intrathecal administration of morphine in addicted patients undergoing CABG surgery leads to the postponement of the first narcotics request, reduction of the total amount of narcotics used for postoperative analgesia and significant reduction of the patient pain in 24 hours after extubation compared to the control group.

Inadequate analgesia during the postoperative period may lead to hemodynamic (tachycardia, hypertension and vasoconstriction), metabolic (increased catabolism), immunological (disabling the immune system) and hemostatic (platelet activity) effects (Murphy GS, 2007; Romano MA, 2004; Frassdorf J, 2005). Therefore, effective analgesia during and after heart surgery has managed the incidence and severity of myocardial ischemia in adults (Scott NB, 2001) and reduce morbidity and mortality in infants (Anand KJ, 1992). Intrathecal morphine pharmacological and pharmacodynamic effects are specifically suited for prolonged postoperative analgesia (CM, 2002). Then the different long-term postoperative pain in patient is because of the differences in the long term effects of intrathecal morphine. The results of this study correspond with the results obtained in different studies. For example, in Roediger et al study, the administration of 500 mg Intrathecal morphine before surgery, could significantly reduce the pain up to 24 hours after extubation compared to control group (Roediger L, 2006). In Dos Santos study, the pain at rest and during coughing was lower in the group receiving 400 mg intrathecal morphine up to 36 hours after surgery (dos Santos LM, 2009). Ong et al in a comprehensive study, compared the different techniques for postoperative analgesia and announced that the administration of epidural anesthesia before surgery could reduce pain in about 25% (Ong CK, 2005). Other studies have also concluded that pre-operative administration of epidural anesthesia is effective in reducing the severity of postoperative pain and its clinical effects can be beneficial (Wong CS, 1997; Subramaniam B, 2000; Aida S, 2000). In contrast, the effects of pre-operative administered local anesthetic and NSAIDs on postoperative analgesia have not been enough to reach a statistically significant and positive result. However, NSAID recipients tend to reduce postoperative pain (Hanlon DM, 2000; Gill P, 2001; Reuben SS, 2001; Nagatsuka C, 2000; Rosaeg OP, 2001; Priya V, 2002; Reuben SS, 2002). In our study, intrathecal morphine was used instead of epidural, because there is no evidence that shows superiority of one of them over another. However, the risk of spinal hematoma with intrathecal technique is less (Vandermeulen EP, 1994) especially in surgeries such as CABG in which anticoagulation should be done before surgery(dos Santos LM, 2009).New guide published by the American Society of Regional Anesthesia and Pain Medicine estimated the risk of spinal hematoma with epidural anesthesia in non-cardiac surgery about 1:150,000 and while using spinal anesthesia about 1:220,000 (Liu SS, 2004; Horlocker TT, 2003). Although the use of intrathecal morphine has the risk of spinal hematoma, but, the use of intrathecal morphine in cardiac surgery is increasing. The increase in the use of this method may be explained by the demand for better analgesia when the chest tube, sternotomy and physiotherapy exercises in the absence of the trained team in pain management. Thus, our study has several clinical applications (Goldstein S, 2001). Previous studies have shown that the effects of intrathecal morphine analgesia in patients undergoing CABG surgery depends on the time of administration and intrathecal morphine administered after surgery is ineffective due to slow onset of action of morphine (Lena P, 2003; Gray JR, 1986).Therefore, in this study, intrathecal morphine was used before the surgery and its impact on reducing narcotics consumption, during surgery, was observed. The obtained results were similar to the observations of Mason et al and dos Santos et al (Mason N, 2001; Dos Santos LM, 2009). In some other studies, the use of intrathecal morphine during surgery could not reduce the consumption narcotics (Lena P, 2003,

Roediger L, 2006). The total amount of narcotics consumed during the 24 hours after surgery and the first time of narcotics demand, in this study showed the very good effect of using intrathecal morphine. The Yapici et al study showed that the use of low dose intrathecal morphine after surgery could reduce overall narcotics consumption. And even significantly reduced the time of admission in the ICU, and no special complications were observed (Yapici D, 2008). In another study, before the surgery, Intrathecal morphine was given to a group of patients and the other group of patients received intravenous morphine and the amount of pain, opioid consumption and postoperative respiratory function was determined. They announced in their results that patients receiving intrathecal morphine levels had lower VAS and postoperative narcotics consumption in the first group was 11.4 ± 3.1 mg, but in the second group was 52.6 ± 6.2 mg that shows large reduction in postoperative opioid consumption, and respiratory depression in the the first group was much lower than in the second group (Nader ND, 2000).

CONCLUSION

Our study showed that the use of low-dose intrathecal morphine provide sufficient postoperative analgesia in a one-day period after surgery. The amount of narcotics consumed in the 24 hours after surgery in the group receiving intrathecal morphine significantly decreased compared to control group. So by using a very low dose of preoperative intrathecal morphine, it is possible to reduce health care costs, complications and length of stay in the intensive care unit and hospital, and finally, improve the patient satisfaction with surgery and postoperative conditions.

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